



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,613	12/05/2003	Naoyuki Takahashi	31721-198597	9104
26694	7590	07/14/2006	EXAMINER	
VENABLE LLP			SONG, MATTHEW J	
P.O. BOX 34385			ART UNIT	
WASHINGTON, DC 20045-9998			PAPER NUMBER	
			1722	
DATE MAILED: 07/14/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

5

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/727,613	TAKAHASHI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Matthew J. Song	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12-17, 19, 20 and 22-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 24 and 26-33 is/are allowed.
- 6) ☒ Claim(s) 12-17, 19-20, 22, 23, 25 and 34-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 12-17, 19-20, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811) in view of Yamazaki et al (US 2005/01589041 A1).

Tanaka et al discloses a method of forming a thin film comprising an oxide single crystal having a quartz crystal structure, this clearly suggests applicant's epitaxial film, (col 2, ln 10-62) on a single crystal substrate of an oxide, such as quartz, sapphire (col 5, ln 10-20) or a silicon single crystal substrate (Examples 6-7). Tanaka et al also discloses a vapor phase deposition for producing an silicon dioxide thin film having a quartz crystal structure at atmospheric pressure using metal alkoxides, such as,  $\text{Si}(\text{OCH}_3)_4$ ,  $\text{Si}(\text{OCH}_3)_4$  or  $\text{Si}(\text{OC}_3\text{H}_7)_4$  (col 7, ln 1-65), where

Art Unit: 1722

these metal alkoxides clearly suggests applicant's tetramethoxysilane, tetraethoxysilane and tetrapropoxysilane, respectively. Tanaka et al also discloses the raw material gas must be mixed with oxidizing gas, such as oxygen, this clearly suggests applicant's reacting the source of silicon with oxygen to deposit a quartz film on the substrate.

Tanaka et al is silent to the use of a catalyst.

In a method of depositing silicon oxide, note entire reference, Yamazaki et al teaches a silicon oxide film is formed using low pressure CVD, and adding hydrogen chloride to the mixed raw material gas ([0030]), this clearly suggests applicant's catalyst. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tanaka et al by adding hydrogen chloride to the atmosphere as taught by Yamazaki et al to prevent sodium contamination ([0031]).

Referring to claims 12, 15, 16 and 20, the combination of Tanaka et al and Yamazaki et al teaches all of the limitations of claims 12, 15, 16 and 20 except the combination of Tanaka et al and Yamazaki et al does not teach the claimed deposition rate, temperature of silicon, the deposition temperature and partial pressure. Deposition rate is a result effective variable that can be controlled with source gas flow rate, temperature, and pressure. Temperature and partial pressure is a well known result effective variable. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tanaka et al and Yamazaki et al to obtain the claimed deposition rate, the claimed temperatures, and claimed partial pressure by conducting routine experimentation of a result effective variable (MPEP 2144.05).

Art Unit: 1722

Referring to claim 13, the combination of Tanaka et al and Yamazaki et al teaches depositing quartz.

Referring to claim 14, the combination of Tanaka et al and Yamazaki et al teaches a sapphire substrate (col 5, ln 1-20).

Referring to claim 17, the combination of Tanaka et al and Yamazaki et al teaches a X ray diffraction profile exhibiting a diffraction peak at  $2\theta=50.6^\circ$  in Fig 1, Fig 4 and Fig 5 for quartz.

Referring to claim 19, the combination of Tanaka et al and Yamazaki et al teaches using an inert gas to dilute the mixed gas, this reads on applicant's inert carrier gas.

3. Claims 25 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811) in view of Yamazaki et al (US 2005/01589041 A1), as applied to claims 12-17, 19-20, and 23 above, and further in view of Okano et al (JP 08-110425), an English abstract is provided in the IDS filed 12/5/03, or in view of Tokunaga et al (JP 05-215929), an English abstract is provided in the IDS filed 12/5/03.

The combination of Tanaka et al and Yamazaki et al teaches all of the limitations of claim 25, as discussed previously, except the combination of Tanaka et al and Yamazaki et al does not teach a crystal buffer layer of quartz.

In a method of forming an optical wave guide, Okano et al teaches a buffer layer 21 is formed on the surface of a Si substrate and a quartz glass film composed of the same composition as the buffer layer is further formed on the quartz film (abstract). Okano et al also teaches forming a quartz glass film 23 and forming another quartz glass film 27, thereon. It

Art Unit: 1722

would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tanaka et al and Yamazaki et al with Okano et al's quartz buffer because warpage is reduced and to produce a useful optical waveguide.

In a method of forming a glass waveguide, Tokunaga et al teaches a buffer layer 2 of quartz is formed on a substrate and a pure quartz film 3 is formed on the buffer layer (abstract). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tanaka et al and Yamazaki et al with Tokunaga et al's buffer layer of quartz to form a glass waveguide with a small transmission loss.

4. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al (US 5,879,811) in view of Yamazaki et al (US 2005/01589041 A1), and further in view of Okano et al (JP 08-110425), an English abstract is provided in the IDS filed 12/5/03, or further in view of Tokunaga et al (JP 05-215929), an English abstract is provided in the IDS filed 12/5/03, as applied to claims 25 and 34-41 above, and further in view of Ohtani et al (US 5,904,770).

The combination of Tanaka et al, Yamazaki et al and Okano et al or the combination of Tanaka et al, Yamazaki et al and Tokunaga et al teaches all of the limitations of claim 22, as discussed previously, except annealing the film.

In a method of forming a silicon oxide film, note entire reference, Ohtani et al teaches annealing a silicon oxide film, formed by CVD using TEOS and ozone, in oxygen or ozone in a temperature range from 400-600°C for a duration of 30-60 minutes (col 8, ln 1-65). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Tanaka et al, Yamazaki et al and Okano et al or the combination of Tanaka et

Art Unit: 1722

al, Yamazaki et al and Tokunaga et al by annealing the film, as taught by Ohtani et al, to improve film quality.

***Allowable Subject Matter***

5. Claims 24 and 26-33 are allowed.

***Response to Arguments***

6. Applicant's arguments with respect to claims 12-17, 19-20, 22-23, 25 and 34-41 have been considered but are moot in view of the new ground(s) of rejection.

7. Applicant's arguments filed 4/19/2006 have been fully considered but they are not persuasive.

Applicant's argument that Yamazaki et al does not teach the use of hydrogen chloride (HCl) as a catalyst is noted but is not found persuasive. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Yamazaki et al teaches the use of the HCl in the deposition of silicon oxide to prevent sodium contamination ([0031]). The fact that applicant has recognized that the addition of HCl acts as a catalyst cannot be the basis for patentability when Yamazaki et al clearly suggests the addition of HCl to the deposition atmosphere because the HCl would naturally acts as a catalyst, as claimed by applicant.

Applicant's argument that Okano and Tokunaga does not teach the use of crystal buffer layer of quartz is noted but is not found persuasive. Applicant alleges that Okano teaches a glass

Art Unit: 1722

buffer layer, not a crystal buffer layer. Okano teaches forming a quartz glass film **23** and forming another quartz glass film **27** on the quartz film **23**. The underlying quartz film **23** clearly suggests applicant's buffer layer of quartz. Tokunuga teaches a buffer layer **2** of quartz is formed on a substrate and a pure quartz film **3** is formed on the buffer layer (abstract). Applicant alleges a quartz glass film is not a crystal film. However, quartz by definition is a crystal of silicon oxide; therefore the quartz layer is a crystal layer.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., buffer layer formed to correct nonconformity in lattices, prevent cracking caused by differential thermal expansion and provide growth in a width direction in the initial growing stage) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Claim 25 merely requires a quartz buffer layer and depositing another quartz layer thereon.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Abe (US 5,146,082) teaches forming quartz using a plasma CVD and tetraethoxysilane, tetramethoxysilane, oxygen, ozone or carbon dioxide as material gases (col 21, ln 1-25).



Art Unit: 1722

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

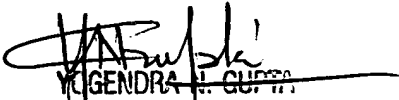
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1722

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song  
Examiner  
Art Unit 1722

MJS  
July 9, 2006

  
YOGENDRA H. GUPTA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700